1 of 3

#20
12/6/03

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
APPEAL TO THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application No.: 09/497,292	Examiner: Kevin M. Burd
Filing Date: 08/28/98	(703) 308-7034
	Group Art Unit: 2631
Inventor: Marino, M.	Attorney Docket: SARA.1090
For: SYSTEM AND METHOD FOR MEASURING RF RADIATED EMISSIONS IN THE PRESENCE OF STRONG AMBIENT SIGNALS	**APPELLANT'S BRIEF**

(1) REAL PARTY IN INTEREST

The real party in interest is Scientific Applications & Research, Inc. (SARA), the employer of the inventor, Michael Marino. The original patent application was assigned to Cassper Instrumentation Systems, Inc. (CISI) by SARA and Mr. Marino, then an employee of SARA, was to move his employment from SARA to CISI. However, the original patent attorney, Mr. Kit M. Stetina, of Stetina Brunda Gerred & Brucker, of Laguna Hills, California, who prepared and filed the patent application, gave up his position, as counsel on the patent application, to SARA and to the undersigned when CISI went out of business. Mr. Marino then returned to work for SARA, and the patent application was recaptured by SARA from CISI by virtue of a default of certain assignment payments evidenced in certain contractural matters between SARA and CISI.

(2) RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to appellant or to the

appellant's legal representative which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

(3) STATUS OF CLAIMS

Claims 40-64 are pending in this application at the time of this appeal. The claims appealed herein are Claims 40-64.

(4) STATUS OF AMENDMENTS

There have been no amendments filed subsequent to final rejection.

(5) SUMMARY OF THE INVENTION

A system for determining the radio frequency (RF) radiation of new electronic equipment, for compliance with FCC and EU Directives (page 2, lines 1-6), and without requiring the use of highly expensive anechoic chambers (page 3, lines 18-32), or radiation experts transported to remote test sites (page 4, lines 32-35; page 5, lines 16-20) the system operating by suppressing RF ambient signals from a signal containing both RF radiated emissions from the electronic device under test and RF ambient signals (Claim 40, lines 1-3), comprising a first RF sensor operative to receive primarily ambient RF signals and radiated RF emissions from the electronic device under test and in electrical communication with a first RF receiver adapted to receive from the first RF sensor both the ambient RF signals and the radiated RF emission (Claim 40, lines 4-7), the first RF receiver being operative to demodulate and digitize the received ambient RF signals and the received radiated RF emissions (Claim 40, lines 8-9), a second RF sensor operative to receive primarily ambient RF signals and in electrical communication with a second

receiver adapted to receive from the second RF sensor the ambient RF signals (Claim 40, lines 10-12), the second RF receiver being operative to demodulate and digitize the receive ambient RF signals (Claim 40, lines 13-14), the first and second receivers being time and frequency synchronized to each other (Claim 40, lines 15-16), a central computer in electrical communication with the first and the second receivers the central computer being operative to store and process the ambient signals and the radiated emissions from respective ones of the first and second receivers (Claim 40, lines 17-20), wherein the central computer is configured as an adaptive filter operative to suppress the ambient RF signals correlated between the first and the second receivers in order to extract the radiated RF emissions of the electronic device under test (Claim 40, lines 21-23).

(6) ISSUES

Group I

1. Whether Claims 40-56, 63 and 64 are unpatentable under 35 U.S.C.§103(a) as obvious over Clough et al (USP 4,672,674).

2. Whether Claims 57-62 are unpatentable under 35 U.S.C.§103(a) as obvious over Clough et al (USP 4,672,674) in view of the instant applications admitted prior art.

Group II

3. Whether Claims 40-56, 63 and 64 are unpatentable under 35 U.S.C.§103(a) as obvious over Chang (USP 4,912,767).

4. Whether Claims 57-62 are unpatentable under 35 U.S.C.§103(a) as obvious over

Chang (USP 4,912,767) in view of the instant applications admitted prior art.

Group III

5. Whether Claims 40-56, 63 and 64 are unpatentable under 35 U.S.C.§103(a) as obvious over Mesecher (USP 6,289,004).

6. Whether Claims 57-62 are unpatentable under 35 U.S.C.§103(a) as obvious over Mesecher (USP 6,289,004) in view of the instant applications admitted prior art.

(i) GROUP I CLAIMS: (Issues 1 and 2)

The Examiner states that

Claims 40-56, 63 and 64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Clough et al (US 4,672,674).

Regarding claims 40, 43 and 54-56, Clough discloses a system for suppressing noise signals from a signal containing both voice data and noise signals. The system comprises a first receiver operative to receive both noise and voice data (column 4 lines 12-14). The first receiver digitizes (figure 1 item 5) the voice data and noise signals. A second receiver operative to receive primarily the noise signals (column 4 lines 14-15). The sampled voice data and noise signals are stored in a storage means for storing the samples from both the first and second receivers (column 3 lines 36-37). The receivers are synchronized to one another since the two signals being obtained have the noise components being correlated (column 4 lines 1-5). The definition of synchronization is having events occur at the same time. These noise components are correlated so they occur at the same time. This allows the subtractor 12 and an adaptive filtering means to

suppress the noise signals in order to extract the voice data (figure 1 and column 3 lines 31-45 and 53-57) and to yield an output signal having an enhanced signal to noise ratio (column 7, lines 53-57).

Clough discloses in the abstract, the first receiver is arranged to be close to the mouth of the user and the second receiver will be spaced apart by a distance of one up to ten cms. Clough does not specifically state what the term "close to the mouth of a user for reception of speech" but it is presumed the distance will be roughly one cm. Therefore, the distance between the microphones will be ten times the distance between the first microphone and the user.

Although Clough does not discloses receiving radiated emissions and ambient signals, Clough does disclose receiving a desired signal (the information signal) and an interfering signal (noise signal), receiving a interfering signal (noise signal) and subtracting the signals to recover the desired signal. It would have been obvious for one of ordinary skill in the art at the time of the invention to utilize this method of cancellation in any application that required the elimination of interfering signals to allow for the recovery of the desired signal.

Interference cancellation in Clough and the claimed invention take place at baseband. A demodulator is necessary in the claimed invention to get the received signal down to baseband. In Clough, it is not. The received signal of Clough is already at baseband. It would have been obvious for one of ordinary skill in the art at the time of the invention to use components available to ensure the input signal is a baseband signal

when interference cancellation is to take place so the interference canceler will operate properly. A demodulator is one of those elements.

Regarding claim 41, Clough discloses a system for suppressing noise signals from a signal containing both voice data and noise signals as stated above. Clough further discloses converting the received signals into a corresponding voltage (figure 1 items 5 and 6).

Regarding claim 42, Clough discloses a system for suppressing noise signals from a signal containing both voice data and noise signals as stated above. Clough further discloses converting the received signals into a corresponding voltage (figure 1 items 5 and 6). Clough does not disclose converting the received signals into a corresponding electrical current. However, it would have been obvious for one of ordinary skill in the art at the time of the invention to convert the received signals into a corresponding electrical current. By converting the signals into electrical current, only a minimal loss of signal strength would occur to the signal while traveling along the electrical conducting cable link as compared to a greater loss in voltage form do to the resistance of the wire.

Regarding claims 44 and 45, Clough further discloses the microphones are coupled to the analog to digital converters (A/D) by and electrical conducting means (figure 1). Regarding claim 46, Clough discloses the two microphones can be arranged in one boom arm (column 3 lines 62-64).

Regarding claims 47-49, 52, 53, 63 and 64, Clough discloses the A/D converters sample the input samples at the same frequency and are therefore synchronized (column 3

lines 14-19). It is inherent that clock signals must be transmitted to each of the A/D converters to maintain this synchronization.

Regarding claim 50, Clough discloses a plurality of microphones can be used to receive the noise signals (column 3 lines 48-52).

Regarding claim 51, Clough discloses a system for suppressing noise signals from a signal containing both voice data and noise signals as stated in paragraph 3. Clough does not disclose the use of a plurality of microphones to receive the voice data and noise signals. However, it would have been obvious for one of ordinary skill in the art at the time of the invention to use a plurality of microphones to receive the voice data and noise signals. With more than one microphone, it is possible to receive a plurality of voice signals from more than one source and after the noise signal has been removed and with proper filtering, all of the voice signals can be recovered.

(A) What the applicant has disclosed is:

DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawings wherein the showings are for purposes of illustrating a preferred embodiment of the present invention only, and not for purposes of limiting the same, Figure 1 shows an ambient suppression test configuration 10 for radiated emissions testing. The test configuration 10 comprises a first receiver 12 and a second receiver 14. The first receiver 12 is in electrical communication with a first field sensor 16. Similarly, the second receiver 14 is in electrical communication with a second field sensor 18. As seen in Figure 1, the first field sensor 16 and the second field sensor

18 are both disposed in a location whereat they may receive ambient RF signals 19. As will be recognized by those of ordinary skill in the-art, the ambient RF signals 19 are typically RF electromagnetic radiation emitted by local transmitters. Such ambient RF signals 19 may be produced by local television and radio stations, cellular phones, citizens band radios, ham radios, civil radios (e.g.,police, ambulance, fire), and aircraft radios to name a few.

The second field sensor 18 is located near an 5 electronic device 20 that is radiating RF device emissions 21 to be measured. The electronic device 20 will emit electromagnetic RF emissions 21 that are to be measured. Accordingly, the second field sensor 18 will receive both ambient RF signals 19 as well as device emissions 21 from the electronic device 20. However, the first field sensor 16 is located in a position whereat it will receive primarily ambient RF signals 19, as seen in Figure 1. The preferred embodiment is to have the first field sensor 16 be at lest ten times further away from the device 20, than the distance from the second field sensor 18 to the device 20. As an example, if the distance from the second field sensor 18 to the device 20 is 3 meters, then the distance from the first field sensor 16 to the device 20 should be at least 30 meters. This "ten times" rule allows the first field sensor 16 to detect the device emissions 21 at a greater than or equal to 20 dB reduction in power level than the second field sensor 18. This minimum 20 dB power level reduction helps to ensure that the first field sensor 16 receives primarily ambient RF signals 19.

The first and second f ield sensors 16, 18 may be in electrical communication with

respective ones of the first and second receivers 12, 14 through a telemetry link. Accordingly, a first telemetry link 46 will be provided between the first field sensor 16 and the first receiver 12. Correspondingly, a second telemetry link 48 will be provided between the second field sensor 18 and the second receiver 14. The first and second telemetry links 46, 48 may be a electrically conducting cable link, an optical fiber link, or an RF telemetry link.

Both the first receiver 12 and the second receiver 14 are in electrical communication with a computer 22. The computer 22 is configured to remove the ambient RF signals 19 from the signals received by the second field sensor 18. Additionally, the computer 22 is capable of controlling the operation of the first and second receivers 12, 14 and capable of storing and processing the digitized data recorded therefrom. In the preferred embodiment, the computer 22 is a 450 MHz Pentium machine running WINDOWS NT 4.0 with a PCI board that contains two digital signal processors and two programmable digital down converters added to speed numerical data processing.

In the preferred embodiment, the first and second receivers 12, 14 are customized receiver systems which are time, frequency, and phase synchronized. The first and second receivers 12, 14 demodulate and digitize the output of the first and second field sensors 16, 18 and transmit such output to the computer 22. Preferably, the first and second receivers 12, 14 are CASSPER@ receivers manufactured by CASSPER@ Instrumentation Systems of Lake Forest, California and are inherently time, frequency, and phase synchronized. For maximum performance, the first and second receivers 12, 14

may be co-located in a single housing and share the same local oscillator clock.

The local oscillator clock may generate a clock signal which is transferred between the first and second receivers 12, 14 through either an optical link (i.e., optical fiber) or a electrically conducting cable. Alternatively, the first and second receivers may be synchronized via an RF telemetry link. It is not necessary for the first and second receivers 12, 14 to be co-located within a single housing, but they may be co-located with respective first and second field sensors 16, 18. In addition to using a single clock to synchronize the first and second receivers 12, 14, each receiver 12, 14 may comprise its own respective clock to provide synchronization therebetween.

Therefore, a first clock will be in electrical communication with the first receiver 12 and a second clock will be in electrical communication with a second receiver 14. The f irst and second clocks will be synchronized therebetween in order to provide synchronization for the first and second receivers 12, 14.

In order to suppress the ambient signals 19, the computer 22 is configured as an adaptive filter signal processing system. Accordingly, the computer 22 receives and records the signals detected by the first and second field sensors 16, 18 and respective ones of the first and second receivers 12, 14. The computer 22 derives the device emissions 21 radiated from the electronic device 20.

Referring to Figure 2, a block diagram of the ambient suppression signal structure shows the signal relationships between the first and second receivers 12, 14 and received ambient signals (a) and device emissions (e) from the electronic device 20. In order to

properly measure the emissions (e) from the electronic device 20, some underlying assumptions must be made. It is assumed that ambient signals (a) are measured by the first and second receivers 12, 14 and such emissions are correlated with each other. Additionally, the emissions (e) from the electronic device 20 are primarily measured by a single receiver (i.e., second receiver 14) . Furthermore, the emissions (e) from the electronic device 20 are not correlated with the ambient signals (a). With these basic underlying assumptions, Figure 2 shows the first receiver 12 measuring ambient signals (a) through some unknown transfer function Hi without emissions (e) from the electronic device 20. The second receiver 14 measures ambient signals (a) through some unknown transfer function H_2 with the emissions e of the electronic device 20. Accordingly, the first receiver 12 receives a signal R1, while the second receiver 14 receives a signal R2. A matrix format for the signal relationships between the first and second receivers 12, 14 is shown below as Equation 1:

$$\begin{bmatrix} R_1 \\ R_2 \end{bmatrix} = \begin{bmatrix} H_1 0 \\ H_2 1 \end{bmatrix} \begin{bmatrix} a \\ e \end{bmatrix}$$

As shown in Equation 1, the upper right matrix term is 0 which indicates that the first field sensor does not measure the device missions. As stated earlier, the preferred field sensor configuration gives a minimum of 20 dB power level reduction of the device emissions at the first field sensor as compared to the second field sensor. This implies that the upper right matrix term of Equation 1 is no larger than 1/100.

Referring to Figure 3, an adaptive filter structure 24 used for suppression of

ambient signals (a) is shown. The adaptive filter structure 24 includes a finite impulse response filter (FIR) 26. The output R_1 from the first receiver 12 is used as the input to the FIR filter 26. The adaptive filter structure 24 further includes a half filter length delay 28. The output R2 of the second receiver 14 is used as the input for the half filter length delay 28.

Accordingly, the output R2 from the second receiver 14 will be delayed by half of the delay for the FIR filter 26. As shown in Figure 3, the output from the FIR filter 26 is subtracted from the delayed output from the second receiver 14. Therefore, a residual signal (r)is produced. The residual (r) is used by a weight control mechanism 30 to adjust the characteristics of the FIR filter 26. An adaptive algorithm for the adaptive filter structure 24 determines the characteristic of the weight control mechanism 30, as will be further explained below.

The adaptive filter structure 24 uses a half filter length delay 28 because the phase relationship between the first and second receivers 12, 14 is not known. The half filter length delay 28 delays the signal from the second receiver 14 thereby allowing the FIR filter 26 to either phase retard or phase advance the relationship between the signals from the first and second receivers 12, 14. This ability is critical because the direction of arrival of the ambient signals (a) is not known, which implies that the ambient signals (a) could sometimes be measured first by the first receiver 12 or first by the second receiver 14. Cancellation of ambient signals (a) for both scenarios require both phase retarding and phase advancement of the relationship of the signals from the first receiver 12 and the

second receiver 14.

As previously mentioned, an adaptive algorithm determines the characteristics of the weight control mechanism 30. The two most common classes of adaptive filter algorithms are Stochastic Gradient based algorithms and Least-square based algorithms. The purpose of the weight control mechanism 30 is to adjust the FIR filter 26 in such a way as to minimize the residual signal (r) . Stochastic gradient algorithms will minimize the mean square of the residual signal (r) . Least-square algorithms will minimize the square of the residual signal (r) . Regardless of the algorithm used, the weight control mechanism 30 will attempt to remove (i.e., suppress) the signals that are correlated between the first and second receivers 12, 14. This results in the residual signal (r) being comprised of those signals that are uncorrelated between the first and second receivers 12, 14.

As previously mentioned, one of the underlying assumptions is that ambient signals (a) are correlated between the first and second receivers, 12, 14 and that device emissions (e) from the electronic device 20 are uncorrelated. These assumptions applied to the cancellation process result in the residual signal (r) being equal to the emissions (e) from the electronic device 20.

Referring to Figure 4, the adaptive filter structure 24, described by Figure 3, is shown using the signal structure described by Figure 2. The half filter length delay 28 can be ignored in Figure 4 because its effect on the system is compensated by the FIR filter transfer function, $H_{2\,a+e}$ is equal to the output of the second receiver14,including ambient

signals (a) and device emissions (e) from the electronic device 20. H_{1a} is equal to the output of the first receiver 12. H_{1a} is inputted into the FIR filter having a transfer function H_f.

Accordingly, the mathematical formulation for the adaptive filter structure 24, as shown in Figure 4, is as follows:

$$r = (H_2a+e) - (H_fH_1a) \qquad (2)$$

Rearranging the terms gives:

$$r = (H_2-H_fH_1) \times (a+e) \qquad (3)$$

Therefore the residual (r) is comprised of two signal types:

$$r = \text{correlated signals} + \text{uncorrelated signals} \qquad (4)$$

Where

Correlated signals = $(H_2-H_f H_1)$ a

Uncorrelated signals = e

The weight control mechanism 30 will remove the correlated signals by adjusting H_f in the following manner:

$$\text{desire:}(H_2-H_fH_1)\ (x)\ a \rightarrow 0$$

$$\text{achieved by: } H_f \rightarrow H_2H_1^{-1}$$

This results in:

$$r \rightarrow e \qquad (6)$$

Therefore, the ambient signals are cancelled and the emissions (e) from the electronic device 20 are correctly extracted.

Referring to Figure 5, a block diagram of a three tap FIR filter 32 is shown. The three tap FIR filter 32 is an example of the finite impulse response filter 26 previously mentioned. The three tap FIR filter 32 consists of a delay T_s 34, a multiplier 36, and an adder 38. Each delay T_s 34 is the time delay associated with the sampling period T_f of the hardware digitizer (e.g. , analog-to-digital converter). As seen in Figure 5, the filter coefficients, $h = [h_0 h_1 h_2]^T$ define the behavior of the three tap FIR filter 32. The coefficients can be complex or real valued. Therefore, the defining equation for an N tap FIR filter is:

$$Y[n] = \sum_{k=0}^{N-1} h_k^s x[n-k] \qquad (7)$$

where: x [n] = sampled input sequence
y [n] = filtered output sequence

In general, each coefficient can be complex so h_k can be described in terms of an amplitude, b_k and a phase term, θ_k

$$h = b_k e^{j\theta}{}_k \qquad (8)$$

Equations 7 and 8 can be combined to give the three tap FIR filter 32 characteristics in terms of magnitude and phase terms, as shown by the following equation:

$$Y[n] = \sum_{k=0}^{N-1} b_k^{e^{-j\theta k}} x[n-k] \qquad (9)$$

The filter coefficients h_k do not change for fixed filters and are real-time adjustable

for adaptive filters. An FIR filter's characteristics are solely determined by the number of taps N and the filter coefficient values h_k.

The use of a finite impulse response filter offers several advantages over other types of filters. These advantages include the FIR filter being stable for finite coefficients. Furthermore, the FIR filter has an inherent time delay which makes it an excellent candidate for transfer functions with delays, such as the present case with multipath signals. Transients for the FIR filter will decay to zero in a finite amount of time.

Additionally, the finite impulse response structure is used in adaptive filters because stability is guaranteed and relatively simple and numerically efficient algorithms exist for adjusting the weight values. Furthermore, performance of the FIR structure is well understood in terms of stability and convergence. The FIR structure is also easy to implement in hardware.

As previously mentioned, the test configuration 10 is ideally suited for scenarios where the ambient signals (a) are received by the first and second receivers 12, 14 through multipaths. Referring to Figure 6, multipath is a situation wherein electromagnetic energy propagates from one location to another through a collection of N multiple paths. Multipath is a common occurrence when measuring ambient signals (a). It is predominately due to signals reflecting from structures, such as buildings, cars, hillsides, etc. The adaptive filter must produce FIR filter characteristics dependant upon the transfer function from the ambient source to each receiver's antenna. Therefore, the FIR filter is required to handle transfer functions with a multipath configuration.

As seen in Figure 6, an example multipath configuration 39 may comprise a first path 40, a second path 42 and a third path 44. Each of the paths 40, 42, 44 can be modeled as having a time delay and a gain factor. The time delay is caused by a difference in propagation length between each path. The gain factor is the amount a given path changes the amplitude of the signal. As an example, the input signal could be a complex sinusoidal signal that is free from multipath, as represented by the following time-domain equation:

$$a(t) = A \cdot e^{j(2\pi f_0 t + \Phi_0)} \qquad (10)$$

For one path, the input signal a(t) is delayed by some amount τ, with a gain factor b. This results in an output:

$$out\ (t) = b\ A \cdot e^{j(2\pi f_0 (t-\tau) + \Phi_0)} \qquad (11)$$

For a sampled data system, the time delay can be modeled as an integer number M of sample periods T_s minus a fractional sample delay $\Delta\tau$. This delay model is represented as:

$$\tau = MT_s - \Delta\tau \qquad (12)$$

Substituting the delay model from Equation 12 into Equation 11 yields an output:

$$out\ (t) = bA \cdot e^{j \cdot [2\pi f_0 (t - MT_s + \Delta\tau) + \Phi_0]} \qquad (13)$$

For a sampled data system, time is represented as an integer multiple n of the sample period. This is represented as:

$$t = nT_s \qquad (14)$$

Substituting the sampled time model from Equation 14 into Equation 13 yields:

$$out(nT_s) = bA \cdot e^{j \cdot [2\pi f_0 (nTs - MTs + \Delta\tau) + \Phi_0]} \quad (15)$$

Rearranging the terms of equation 15 yields:

$$out(nT_s) = be^{j \cdot 2\pi f_0 (\Delta\tau)} \cdot Ae^{j \cdot [2\pi f_0 T_s (n-m) + \Phi_0]} \quad (16)$$

For sampled data systems, the sample period factor is normally dropped and square brackets are used to denote sampled signals, as opposed to continuous time signals. Accordingly, this yields:

$$out[n] = be^{j \cdot 2\pi f_0 (\Delta\tau)} \cdot Ae^{j \cdot [2\pi f_0 T_s (n-M) + \Phi_0]} \quad (17)$$

Equation 17 can be alternatively expressed as:

$$out[n] = be^{j \cdot \theta} \cdot a[n-M] \quad (18)$$

Where:

$$\theta = 2\pi f_0(\Delta\tau) \quad (19)$$

$$a[n-M] = Ae^{j \cdot [2\pi f_0 T_s (n-M) + \Phi_0]} \quad (20)$$

Equation 18 shows the effect of a one path time delay and gain factor on an ambient signal. For multipath measurements, the measured signal would be a sum of signals that are shown in Equation 18, with each path having its own gain and phase terms.

A comparison of the FIR characteristics, as given in Equation 9, to the summation of multipath signals from Equation 18 illustrates the matching of the FIR structure to the multipath model. As shown in Equation 5, H_f of the adaptive FIR filter converges to $H_2H_1^{-1}$ when complete cancellation has occurred. Multipath in the signals received by the

second receiver 14 (as seen by H_2) does not reduce cancellation performance because the structure of the FIR filter matches the multipath model. However, when multipath is present in the reference receiver's measurement (i.e., first receiver 12), the FIR filter estimates the response of an infinite impulse response filter (IIR) because H_1^{-1} must be estimated. This is not a problem because an arbitrarily long FIR filter, with sufficient delay, can accurately estimate an IIR filter's response. As the FIR filter length increases, the estimation error in the FIR solution decreases toward zero. This can be accomplished with arbitrary accuracy.

Additional modifications and improvements of the present invention may also be apparent to those of ordinary skill in the art. Thus, the particular combination of parts described and illustrated herein is intended to represent only a certain embodiment of the present invention, and is not intended to serve as a limitation of alternative devices within the spirit and scope of the invention.

(B) What Applicant has claimed is:

40. (A representative broad claim) A system for suppressing RF ambient signals from a signal containing both RF radiated emissions of an electronic device and RF ambient signals, the system comprising:

a) a first RF sensor operative to receive primarily ambient RF signals and radiated RF emissions from the electronic device and in electrical communication with a first RF receiver adapted to receive from said first RF sensor both ambient RF signals and the radiated RF

emissions;

b) said first RF receiver being operative to demodulate and digitize the received ambient RF signals and the received radiated RF emissions;

c) a second RF sensor operative to receive primarily ambient RF signals, and in electrical communication with a second receiver adapted to receive from said second RF sensor the ambient RF signals;

d) said second RF receiver being operative to demodulate and digitize the received ambient RF signals;

e) said first and said second receivers being time and frequency synchronized to each other;

f) a central computer in electrical communication with said first and said second receivers, said central computer being operative to store and process the ambient signals and the radiated emissions from respective ones of said first and said second. receivers;

g) wherein the central computer is configured as an adaptive filter operative to suppress the ambient RF signals correlated between the first and second receivers in order to extract the radiated RF emissions of the electronic device.

57. The method of Claim 40 wherein the step of demodulating and digitizing the ambient RF signals with the second RF receiver comprises suppressing the ambient RF signals using a Gradient Descent method with the adaptive filter.

(C) What Applicant has argued:

As to Claims 40-56, 63 and 64, Clough does not demodulate the incoming signals. Neither does he synchronize them.. Neither of these operations is shown or described or implied in Clough. The examiner is not permitted to put words into the mouth of patents. Where that allowed, only one patent would have ever been issued from the U.S. Patent Office and it would thereafter "impliedly" anticipate or obviate all other inventions made subsequent thereto.

> In paragraph 3 of the last Office Action, the examiner states: Clough also states in column 7, lines 48-52, the signals are sampled at the same constant discrete time intervals in each A/D converter. The A/D converters are synchronize, then the receivers are synchronized.

This is a stunning statement. In the first place, lines 48-52 are in the *claims* of the Clough patent. In the second place, 35 U.S.C. §112, 2nd paragraph, requires the claims to "particularly point out and distinctly claim the subject matter which the applicant regards as his invention. Clough states, at lines 48-52:

> (c) sampling means connected with said first and second microphones for sampling the speech and other signals at constant discrete intervals of time, the speech signals representing information and noise and the other signals representing noise..."

In the third place, the examiner does not understand that "sampling" does not mean "synchronizing" nor does it mean "demodulating". In the fourth place, sampling of two separate streams of signals at constant discrete intervals of time does not mean that

sampling or the signals are synchronized. Sampling of two separate streams of signals at constant discrete intervals of time does not mean that the signals are demodulated. The examiner does not show the antecedent basis for this statement in the Clough claim nor in the patent specification. Nowhere in Clough is the word "synchronize" even printed. This rejection argument is a fantasy of the examiner's imagination.

The examiner makes the following statement in his Office Action:

> "The A/D converter is a component of each of the receivers. If the A/D converters are synchronized, then the receivers are synchronized."

In the first place, there is no disclosure, implication, or suggestion that Clough's A/D converters are synchronized. The word "synchronizing", as well as the word k"demodulation" does not appear in Clough. Again, this is sheer fantasy. In the second place, implying that if one component is synchronized than another domponent is cynchronized is simply ludicrous. Clearly, no patent examiner would alow this short of twisted logic to be used as support for any claim in a patent. Likewise, no such twisted logic should be allowed as a basis for rejection of a claim.

The examiner has "divined" that Clough involves digitization and synchronization yet nothing is shown, in the specification or in the drawings, to support this argument. However, at the same time, the examiner insists that Applicant place such a notice *in Applicant's drawings* of the allegedly same operations. What is good for the goose is good for the gander comes to mind. However, whatever the basis the examiner uses, to argue that, where not shown, Clough reveals digitization and demodulation, and

Applicant must amend his drawings to actually show such action, supports that argument that the examiner is grasping at straws.

As to the argument about synchronization being based upon two things showing up at the same time, Applicant's counsel enters his office at 7:30 a.m. each morning during the week just as Applicant's secretary also enters his office. The office does not open until 8:00 a.m. Applicant is not married to or live with his secretary. Neither Applicant's counsel nor Applicant's secretary has ever discussed the "synchronization" of their arrivals. The examiner is thus making an argument based on perception but not based upon common sense.

The examiner goes on to state:

> These noise components are correlated so they occur at the same time. This allows the subtractor 12...

First, the examiner said the noise components were "synchronized". Now he says they are correlated. Correlation is different from synchronization and one does not imply the other. More shocking is the examiner's use of the word "subtractor" in his reference to item 12 of Clough. The inventors in Clough defined item 12 as "...a summing circuit..." (Col 3, line 29) and (col. 7, line 14). Nowhere in the entire Clough patent is there a "subtractor 12" or any item termed a "subtractor".

The examiner misses the point of Applicant's invention. While Clough and others direct their inventions to cancel audio signals, that are typically in the range of 20 Hz to 20,000 Hz, Applicant's invention is used to cancel RF ambient signals that are

typically in the range of several million Hz to several billion Hz. Still further, while audio signals travel very slowly, RF signals travel at the speed of light which makes acoustics much easier to cancel. None of this is suggested in Clough.

As to claims 57-62, despite what the examiner states is the prior art admitted by the Applicant, the fact of the matter is that Clough is not relevant to the rejection under 35 U.S.C. §103(a) and, therefore, the rejection based upon Clough and the allegedly admitted prior art must fail.

In summary, the examiner states that Clough does not mention synchronization, summing circuit 12 is really a subtractor 12, has not definition of what is "close to the mouth", does not disclose receiving radiated emissions, is already at base line, does not disclose converting the received signal to a corresponding electrical voltage, has an inherent clock signal, and does not disclose a plurality of microphones. All of this is claimed by Applicant. Where does the examiner get these ideas from? He says its obvious for someone skilled in the art to take Clough and manufacture Applicant's claimed invention. The examiner has shown absolutely no reason for such statements.

(ii) GROUP II CLAIMS: (Issues 3 and 4)

The Examiner states that Claims 40-56, 63 and 64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang (US 4,912,767).

Regarding claims 40, 41, 43 and 54-56, Chang discloses a system for suppressing noise signals from a signal containing both voice data and noise signals. The system

comprises a first receiver operative to receive both noise and voice data (abstract) and a second receiver operative to receive primarily the noise signals (abstract). The first and second receiver are synchronized. Chang states the noise components of the received signals are correlated so they will occur at the same time (column 4, lines 44-50). The noise components will occur at the same time since any time differences will be compensated for (column 4, lines 51-56). An adaptive filtering means suppresses the noise signals in order to extract the voice data (figure 2 and abstract and column 6 lines 8-15). Chang discloses the noise signals and the voice data /noise signals inputs are received by microphones (column 5 lines 17-29) and the microphones are spaced apart some distance apart.

Although Chang does not discloses receiving radiated emissions and ambient signals, Chang does disclose receiving a desired signal (the information signal) and an interfering signal (noise signal), receiving a interfering signal (noise signal) and subtracting the signals to recover the desired signal. It would have been obvious for one of ordinary skill in the art at the time of the invention to utilize this method of cancellation in any application that required the elimination of interfering signals to allow for the recovery of the desired signal.

Chang does not disclose digitizing the received signals prior to the cancellation step. It would have been obvious for one of ordinary skill in the art at the time of the invention to digitize the received signals. The digitized signals are much easier to store. The stored data will provide a reference and allow the received data to be monitored at a

later data to ensure proper reception had occurred.

Interference cancellation in Chang and the claimed invention take place at baseband. A demodulator is necessary in the claimed invention to get the received signal down to baseband. In Chang, it is not. The received signal of Chang is already at baseband. It would have been obvious for one of ordinary skill in the art at the time of the invention to use components available to ensure the input signal is a baseband signal when interference cancellation is to take place so the interference canceler will operate properly. A demodulator is one of those elements.

Regarding claim 42, Chang further discloses converting the received signals into a corresponding voltage (figure 1 items 5 and 6). Chang does not disclose converting the received signals into a corresponding electrical current. However, it would have been obvious for one of ordinary skill in the art at the time of the invention to convert the received signals into a corresponding electrical current. By converting the signals into electrical current, only a minimal loss of signal strength would occur to the signal while traveling along the electrical conducting cable link as compared to a greater loss in voltage form do to the resistance of the wire.

Regarding claims 44 and 45, Chang further discloses the microphones are coupled to the adaptive filters by and electrical conducting means (figure 2).

Regarding claim 46, Chang discloses the two microphones can be arranged on a pilot's face mask (column 5 lines 17-29).

Regarding claims 47-49, 52, 53, 63 and 64, Chang discloses the receivers

are synchronized (column 4 lines 44-56). It is inherent that clock signals must be transmitted to each of the receivers to maintain this synchronization.

Regarding claims 50 and 51, Chang does not disclose the use of a plurality of microphones to receive the voice data and noise signals. However, it would have been obvious for one of ordinary skill in the art at the time of the invention to use a plurality of microphones to receive the voice data and noise signals. With more than one microphone, it is possible to receive a plurality of voice signals from more than one source and after the noise signal has been removed and with proper filtering, all of the voice signals can be recovered.

Claims 57-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang (US 4,912,767) in view of the instant applications admitted prior art.

Regarding claims 57-62, Chang discloses a system for suppressing noise signals from a signal containing both voice data and noise signals as stated in paragraph 3. Chang further discloses adaptive filtering is conducted to recover an audible signal (figure 2). However, Chang does not disclose which adaptive algorithm is used. "The two most common classes of adaptive filter algorithms are Stochastic Gradient based algorithms and Least-square based algorithms" page 16 lines 21-23 of the instant application. It would have been obvious for one of ordinary skill in the art to use the most common types of adaptive algorithms in the adaptive filtering conducted by Chang since these types of algorithms are the most widely used.

(A) What the Applicant has disclosed (See Page 7-19 above)

(B) What the Applicant has claimed:

40. (A representative broad claim) A system for suppressing RF ambient signals from a signal containing both RF radiated emissions of an electronic device and RF ambient signals, the system comprising:

a) a first RF sensor operative to receive primarily ambient RF signals and radiated RF emissions from the electronic device and in electrical communication with a first RF receiver adapted to receive from said first RF sensor both ambient RF signals and the radiated RF emissions;

b) said first RF receiver being operative to demodulate and digitize the received ambient RF signals and the received radiated RF emissions;

c) a second RF sensor operative to receive primarily ambient RF signals, and in electrical communication with a second receiver adapted to receive from said second RF sensor the ambient RF signals;

d) said second RF receiver being operative to demodulate and digitize the received ambient RF signals;

e) said first and said second receivers being time and frequency synchronized to each other;

f) a central computer in electrical communication with said first and said second receivers, said central computer being operative to store and process the ambient signals and the radiated emissions from respective ones of said first and

said second. receivers;

g) wherein the central computer is configured as an adaptive filter operative to suppress the ambient RF signals correlated between the first and second receivers in order to extract the radiated RF emissions of the electronic device.

57. (A representative claim) The method of Claim 40 wherein the step of demodulating and digitizing the ambient RF signals with the second RF receiver comprises suppressing the ambient RF signals using a Gradient Descent method with the adaptive filter.

(C) What the Applicant has argued:

The examiner goes on in paragraph 3 of his Office Action to state:

> Chang discloses in column 4, lines 44-56 that noise that is detected in each receiver will be on the same frequency. The receivers are synchronized to the same frequency. Chang also states the receivers receive signals at the same time. However, since this occurs, the signals will be displaced in time due to the differences in the length [of] the path the signal must travel. This difference in time is then compensated for so the subtraction step removes the proper signal components.

The examiner fails to understand, again, that just because two receivers receive the same signal, they are not synchronized unless it is said that they are synchronized. In addition, neither the words "synchronize" or "demodulate" appear anywhere in Chang. Chang has no relevance to Applicant's application.

However, Chang is more important than merely what the examiner said

about it. Note that Chang has three drawing figures. Note also that Change has no reference numbers anywhere on the drawings. Below is a Glossary of the terms used in Chang to describe his invention:

Figure	**Number**	**Item**
1	10	Prior art (no number shown)
1	11	Subtract circuit (no number shown)
1	12	One microphone (no number shown)
1	13	Another microphone (no number shown)
1	14	Adaptive filter (no number shown)
1	15	Voice recognition system (no number shown)
2	16	Invention (no number shown)
2	17	Sensor (no number shown)
2	18	Sensor (no number shown)
2	19	Group (col 5/line 49) narrow band filter (5/57)
2	20	Group (5/49) narrow band filter (5/58) (no number shown)
2	21	Adaptive filter (no number shown)
2	22	Group (no number shown)
2	23	Voice recognition system (no number shown)
3	24	? (no number)
3	25	? (no number)
3	26	? (no number)

35 U.S.C.§112 states in part:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Chang does not contain a written description in full, clear, concise, and exact terms. It is a joke as a patent. It has no drawing numbers with which to explain the invention. It does not use the word "synchronization" or the word "demodulate" anywhere in the Abstract, Specification or the Claims yet the examiner insists Chang is an invention using synchronization.

During prosecution, the examiner objected to Applicant's drawings alleging that "means to digitize" and to "demodulate" the received signals and the "converting signals to a corresponding voltage or current" must be shown or the features canceled from the claims. Neither Clough or Chang shows any separate element or box or other icon for "means to digitize" and to "demodulate" the received signals and the "converting signals to a corresponding voltage or current". If Clough and Chang do not show these process steps, why does Applicant have to show them? The answer is that Clough and Chang do not have these steps and that is why they are not shown. Now the examiner cannot put words into the mouths of Clough and Chang and make them do something they have never been structured to do.

Accordingly, since Chang does not disclose receiving radiated emissions, does not disclose digitizing the received signals, does not show a demodulator, does not disclose converting the received signals into a corresponding electrical current, does not disclose use of a plurality of microphones, and does not disclose an adaptive algorithm, it, like Clough, is not relevant to Applicant's claimed

invention the rejections should not stand.

As to claims 57-62, despite what the examiner states is the prior art admitted by the Applicant, the fact of the matter is that Chang is not relevant to the rejection under 35 U.S.C. §103(a) and, therefore, the rejection based upon Chang and the allegedly admitted prior art must fail.

(iii) GROUP III CLAIMS: (Issues 4 and 5)

Claims 40-53, 63 and 64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mesecher et al (US 6,289,004).

Regarding claims 40, 43-46, Mesecher discloses a system for supressing interference signals from a desired signal. A first RF receiver receives a signal such that the only large signal received by the auxiliary antenna is the signal from the interferer (column 3, line 65 to column 4, line 2). The main antenna receives the desired signal and a noise component of the interferer. Both antennas are located in the same apparatus as shown in figure 3B. The interferer signal is subtracted from the signal of the main antenna thereby deriving a signal substantially free from the interference source (column 4, lines 25-29). Figure 12 shows the received signal are input to RF receivers. The RF receivers will demodulate the data before inputting the signals to the interference canceler (column 9, lines 61-67). In addition, the received signals are required to be synchronized before subtraction can take place (column 10, lines 8-10). The result of the subtraction is processed and stored in the modem shown in figure 5.

Mesecher does not disclose the received signals are digitized prior to the subtraction taking place. In figure 5, Mesecher shows the subtraction takes place then the signal is converted to a digital signal. The signal must be converted to a digital signal before being input to the modem for processing and for final transmission. It would have been obvious for one of ordinary skill in the art at the time of the invention to digitize the signal at any point prior to being input to the modem so the signal would be in proper format for the processing and storage in the modem to take place as well as simplifying the circuitry required for the subtraction to take place in the interference canceler.

Regarding claims 41 and 42, Mesecher further discloses converting the received signals into a corresponding voltage (figure 12). Mesecher does not disclose converting the received signals into a corresponding electrical current. However, it would have been obvious for one of ordinary skill in the art at the time of the invention to convert the received signals into a corresponding electrical current. By converting the signals into electrical current, only a minimal loss of signal strength would occur to the signal while traveling along the electrical conducting cable link as compared to a greater loss in voltage form do to the resistance of the wire.

Regarding claims 47-49, 52, 53, 63 and 64, Mesecher discloses the receivers are synchronized (column 10, lines 8-10). It is inherent that clock signals must be transmitted to each of the receivers to maintain this synchronization.

Regarding claims 50 and 51, Mesecher discloses in figure 3B the auxiliary antenna is capable of receiving numerous signals from the interferer to receive the most accurate representation of the interferer signal. The same principle can be used for the main antenna.

Claims 57-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mesecher et al (US 6.289.004) in view of the instant applications admitted prior art.

Regarding claims 57-62, Mesecher discloses a system for suppressing noise signals from a signal containing both a desired data signal and noise signals as stated above. Mesecher further discloses adaptive filtering means is conducted to recover the desired data signal (figure 12). However, Mesecher does not disclose how this calculation is computed. It would have been obvious for one of ordinary skill in the art to use the most common types of adaptive algorithms in the adaptive filtering conducted by Mesecher since these types of algorithms are the most widely used.

(A) What the Applicant has disclosed (See Page 7-19 above)

(B) What the Applicant has claimed:

40. (A representative broad claim) A system for suppressing RF ambient signals from a signal containing both RF radiated emissions of an electronic device and RF ambient signals, the system comprising:

a) a first RF sensor operative to receive primarily

ambient RF signals and radiated RF emissions from the electronic device and in electrical communication with a first RF receiver adapted to receive from said first RF sensor both ambient RF signals and the radiated RF emissions;

b) said first RF receiver being operative to demodulate and digitize the received ambient RF signals and the received radiated RF emissions;

c) a second RF sensor operative to receive primarily ambient RF signals, and in electrical communication with a second receiver adapted to receive from said second RF sensor the ambient RF signals;

d) said second RF receiver being operative to demodulate and digitize the received ambient RF signals;

e) said first and said second receivers being time and frequency synchronized to each other;

f) a central computer in electrical communication with said first and said second receivers, said central computer being operative to store and process the ambient signals and the radiated emissions from

respective ones of said first and said second. receivers;

g) wherein the central computer is configured as an adaptive filter operative to suppress the ambient RF signals correlated between the first and second receivers in order to extract the radiated RF emissions of the electronic device.

57. (A representative claim) The method of Claim 40 wherein the step of demodulating and digitizing the ambient RF signals with the second RF receiver comprises suppressing the ambient RF signals using a Gradient Descent method with the adaptive filter.

(B) What the Applicant has argued:

Mesecher is directed to the cancellation of one or more "known" or "fixed" ambient signals (col. 1, lines 7-13), that is the patent requires that the direction of arrival of the ambient signals are fixed and do not change. Mesecher assumes that each interfering signal operates at a single "known" center frequency (col 1, lines 66-col 2., lines 1-2) That is, if the known interference signal changes its center frequency, then the system can no longer subtract it without recalibration. The examiner is also quick to point out that Mesecher does not disclose the received signals are digitized prior to the subtraction taking place. The examiner has not shown Mesecher will work if the incoming signals are digitized prior to subtraction taking place. In light of the fact that Applicant's invention does not use

subtraction, the examiner has failed to support his next contention that:

> It would have been obvious for one of ordinary skill in the art at the time of the invention to digitize the signal at any point prior to being input to the modem so the signal would be in proper format for the processing and storage in the modem to take place as well as simplifying the circuitry required for the subtraction to take place in the interference canceler.

The examiner is taking Mesecher out of context, has added his own invention, and is attempting to use this combination to reject Applicant's claims. Besides the fact that, in using Mesecher to reject Applicant's claims, the examiner has criticized Mesecher for not including digitizing prior to being input to the modem which is not only unwarranted in this case but further indicates the examiner is using Mesecher, not for its teaching of the invention, but as a framework to reject patents that have nothing to do with Mesecher's objects.

7. Additional evidence of non-obviousness.

In his response to the first Office Action, Applicant submitted evidence of non-obviousness. It is of record in the prosecution file and the Board of Appeals is invited to review that evidence. While it did not impress the examiner in this case, it is relevant to the issue of unobviousness, *Stratoflex, Inc. v. Aeroquip Corporation*, 713 F.2d 1530, 1538-40, 218 USPQ 871, 879 (Fed. Cir. 1983) "...evidence of secondary considerations may often be the most probative and cogent evidence in the record. It may often extablish that an invention appearing to be obvious in light of prior art was not."

The evidence comprises: Exhibit A is a product brochure of the instant invention describing its functions and benefits. Exhibit B is a "Reader's Choice" award and "Product of the Week" award, issued by Evaluation Engineering magazine describing the instant invention and its benefits. Exhibit C is another "Reader's Choice" award from Evaluation Engineering magazine, showing, on page 2, under the heading "EMC", the instant invention as being chosen as one of the best EMC products of 1999. Exhibit D is an article by the inventor of the instant invention and others concerning the invention that was printed in the August 2000 issue of Conformity magazine. Exhibit E is another "Product of the Week" award issued for the instant invention for ChipCenter, the Internet's definitive resource. Exhibit F is a reprint of an article about the instant invention appearing in a recent issue of Compliance Engineering, Evaluation Engineering, Test & Measurement World magazine. Exhibit G is a reprint of an article about the instant invention for the U.S. Air Force. (These are of record in the patent application file folder and are not reproduced herein to conserve paper).

8. Summary

None of the references cited by the examiner in this prosecution make Applicant's invention obvious within the context of 35 U.S.C. §103(a). The examiner has to stretch the teachings of Clough, Chang and Mesecher way beyond reasonable bounds in order to make his arguments. The statement, "It would have been obvious to one skilled in the art to ...." is not applicable in this case

because (1) neither Clough, Chang or Mesecher disclose the invention, (2) Clough, Chang and Mesecher do not disclose they receive radiated emissions, (3) Clough and Chang doe not use a demodulator, (3) Clough, Chang and Mesecher do not digitize the incoming signals, (4) Clough, Chang and Mesecher do not synchronize the incoming signals, (5) Clough and Chang do not disclose the use of two microphones, (6) and Chang does not teach any invention because it does not comply with the minimum requirements under 35 U.S.C.§112.

For these reasons, it is respectfully requested that the Board reverse the actions of the examiner and allow these claims to issue into a U.S. patent.

(9) APPENDIX (The claims are arranged in descending order of dependency)

40. A system for suppressing RF ambient signals from a signal containing both RF radiated emissions of an electronic device and RF ambient signals, the system comprising:

a) a first RF sensor operative to receive primarily ambient RF signals and radiated RF emissions from the electronic device and in electrical communication with a first RF receiver adapted to receive from said first RF sensor both ambient RF signals and the radiated RF emissions;

b) said first RF receiver being operative to demodulate

and digitize the received ambient RF signals and the received radiated RF emissions;

c) a second RF sensor operative to receive primarily ambient RF signals, and in electrical communication with a second receiver adapted to receive from said second RF sensor the ambient RF signals;

d) said second RF receiver being operative to demodulate and digitize the received ambient RF signals;

e) said first and said second receivers being time and frequency synchronized to each other;

f) a central computer in electrical communication with said first and said second receivers, said central computer being operative to store and process the ambient signals and the radiated emissions from respective ones of said first and said second. receivers;

g) wherein the central computer is configured as an adaptive filter operative to suppress the ambient RF signals correlated between the first and second receivers in order to extract the radiated RF emissions of the electronic device.

41. The system of Claim 40 wherein the first and second RF sensors are operative to convert RF signals into corresponding voltages.

42. The system of Claim 40 wherein the first and second RF sensors are operative to convert RF signals into corresponding electrical currents.

43. The system of Claim 40 wherein the first and second RF sensors are RF antennas.

44. The system of Claim 40 further comprising:

a first telemetry link between the first RF sensor and the first RF receiver; and

a second telemetry link between the second R-F sensor and the second RF receiver.

45. The system of Claim 40 wherein the first RF receiver is co-located with the first RF sensor and the second RF receiver is co-located with the second R-F sensor.

46. The system of Claim 40 wherein the first and second RF receivers are co-located within a single housing.

47. The system of Claim 40 further comprising a clock operative to generate a clock signal that synchronizes the first and second RF receivers.

48. The system of Claim 40 further comprising an optical fiber extending between and communicating with the first and second RF receivers in order to transfer the clock signal therebetween.

49. The system of Claim 40 further comprising an electrically conducting cable, extending between and communicating with the first and second RF receivers., in order to transfer the clock signal therebetween.

50. The system of Claim 40 wherein the second RF receiver comprises a plurality of RF receivers operative to receive primarily the ambient signals.

51. The system of Claim 40 wherein the first RF receiver comprises a plurality of RF receivers operative to receive the ambient signals and the radiated emissions from the electronic device.

52. The system of Claim 40 further comprising:

a first clock in electrical communication with the first RF receiver;

and a second clock in electrical communication with the second RF

receiver; wherein the first clock and the second clock are synchronized in order to synchronize the first and second RF receivers.

53. The system of Claim 40 wherein the first and second RF receivers are synchronized via an external RF reference signal.

54. A method of suppressing ambient RF signals from an RF signal generated by an electronic device, said RF signal containing radiated RF emissions of said electronic device, using a first RF sensor and receiver, a second RF sensor and receiver, and an adaptive filter, the method comprising the steps of

a) locating said first RF sensor near said electronic device to receive the RF signal therefrom, said sensor placed in electrical communication with said first RF receiver;

b) demodulating and digitizing the ambient RF signals and the radiated RF emissions with the first RF receiver;

c) locating said second RF sensor at least ten times further away from said first RF sensor than the distance

from said first RF sensor to the electronic device, said sensor placed in electrical communication with said second RF receiver;

d) synchronizing the time and frequencies of the ambient signals and the radiated signals in each said first RF receiver and said second RF receiver;

e) demodulating and digitizing the ambient RF signals with the second RF receiver;

f) suppressing the ambient RF signals correlated between the first RF receiver and the second RF receiver with the adaptive filter.

55. The method of Claim 54 wherein the adaptive filter is implemented on a computer and the step of demodulating and digitizing the ambient RF signals with the second RF receiver comprises suppressing the ambient RF signals with the adaptive filter of the computer.

56. The method of Claim 54 wherein at least some of the ambient RF signals have multiple paths, and the step of demodulating and digitizing the ambient RF signals with the second RF receiver comprises suppressing the ambient RE signals having multiple paths.

57. The method of Claim 54 wherein the step of demodulating and digitizing the ambient RF signals with the second RF receiver comprises suppressing the ambient RF signals using a Gradient Descent method with the adaptive filter.

58. The method of Claim 54 wherein the step of demodulating and digitizing the ambient RF signals with the second RF receiver comprises suppressing the RF ambient signals using a Stochastic Gradient method with the adaptive filter.

59. The method of claim 54 wherein the step of demodulating and digitizing the

ambient RF signals with the second RF receiver comprises suppressing the ambient RF signals using a Least Squares method with the adaptive filter.

60. The method of Claim 54 wherein the step of demodulating and digitizing the ambient RF signals with the second RF receiver comprises suppressing the ambient RF signals with a Finite Impulse Response filter.

61. The method of Claim 54 wherein the step of demodulating and digitizing the ambient RF signals with the second RF receiver comprises

suppressing the ambient RF signals with an Infinite Impulse Response filter.

62. The method of Claim 54 wherein the step of demodulating and digitizing the ambient RF signals with the second RF receiver comprises suppressing the ambient RF signals with an adaptive filter configured as a neural network.

63. The method of Claim 54 wherein the first and second RF receivers are synchronized via a common clock.

64. The method of Claim 54 wherein the first and second RF receivers are synchronized via an external RF reference signal.

Respectfully submitted,

John J. Murphey, Reg. No. 24,896
Attorney for Applicant
MURPHEY & MURPHEY, APC
Pacific Center One, Suite 260
701 Palomar Airport Road
Carlsbad, California 92009-1027
Telephone: (760) 431-0091
Facsimile: (760) 431-9441
e-mail: JMurphey@mmiplaw.com
Dated: November 26, 2002

11-29-02

AF 2600
$

PTO/SB/21 (08-00)
Approved for use through 10/31/2002. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	09/497,292
Filing Date	08/28/98
First Named Inventor	Marino, M.
Group Art Unit	2631
Examiner Name	Kevin M. Burd
Attorney Docket Number	SARA.1090
Total Number of Pages in This Submission	140

ENCLOSURES *(check all that apply)*

- [x] Fee Transmittal Form
  - [x] Fee Attached
- [ ] Amendment / Reply
  - [ ] After Final
  - [ ] Affidavits/declaration(s)
- [ ] Extension of Time Request
- [ ] Express Abandonment Request
- [ ] Information Disclosure Statement
- [ ] Certified Copy of Priority Document(s)
- [ ] Response to Missing Parts/ Incomplete Application
  - [ ] Response to Missing Parts under 37 CFR 1.52 or 1.53
- [ ] Assignment Papers *(for an Application)*
- [ ] Drawing(s)
- [ ] Licensing-related Papers
- [ ] Petition
- [ ] Petition to Convert to a Provisional Application
- [ ] Power of Attorney, Revocation Change of Correspondence Address
- [ ] Terminal Disclaimer
- [ ] Request for Refund
- [ ] CD, Number of CD(s) ______
- [ ] After Allowance Communication to Group
- [ ] Appeal Communication to Board of Appeals and Interferences
- [ ] Appeal Communication to Group *(Appeal Notice, Brief, Reply Brief)*
- [ ] Proprietary Information
- [ ] Status Letter
- [x] Other Enclosure(s) *(please identify below)*:

Appellant's Brief/3 copies
postcard
Check No. 9627/filing fee

Remarks: There are 3 copies of a 46-page brief

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual name	MURPHEY & MURPHEY, A.P.C. John J. Murphey
Signature	[signature]
Date	Nov. 26, 2002

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, Washington, DC 20231 on this date: 11/26/02

Typed or printed name	Lois Murphey
Signature	Lois Murphey
Date	11/26/2002

EV213584306US

EW

PTO/SB/17 (10-01)
Approved for use through 10/31/2002. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

FEE TRANSMITTAL for FY 2002

Patent fees are subject to annual revision.

TOTAL AMOUNT OF PAYMENT ($) 160.00

Complete if Known	
Application Number	09/497,292
Filing Date	08/28/98
First Named Inventor	Marino, M.
Examiner Name	Kevin M. Burd
Group Art Unit	2631
Attorney Docket No.	SARA.1090

METHOD OF PAYMENT

1. ☐ The Commissioner is hereby authorized to charge indicated fees and credit any overpayments to:

Deposit Account Number

Deposit Account Name

☐ Charge Any Additional Fee Required Under 37 CFR 1.16 and 1.17

☐ Applicant claims small entity status. See 37 CFR 1.27

2. ☒ Payment Enclosed:

☒ Check ☐ Credit card ☐ Money Order ☐ Other

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
101	740	201	370	Utility filing fee	
106	330	206	165	Design filing fee	
107	510	207	255	Plant filing fee	
108	740	208	370	Reissue filing fee	
114	160	214	80	Provisional filing fee	

SUBTOTAL (1) ($)

2. EXTRA CLAIM FEES

			Extra Claims		Fee from below		Fee Paid
Total Claims		-20** =		X		=	
Independent Claims		- 3** =		X		=	
Multiple Dependent						=	

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
103	18	203	9	Claims in excess of 20
102	84	202	42	Independent claims in excess of 3
104	280	204	140	Multiple dependent claim, if not paid
109	84	209	42	** Reissue independent claims over original patent
110	18	210	9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($)

***or number previously paid, if greater; For Reissues, see above*

FEE CALCULATION (continued)

3. ADDITIONAL FEES

RECEIVED
DEC 0 3 2002
Technology Center 2600

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
105	130	205	65	Surcharge - late filing fee or oath	
127	50	227	25	Surcharge - late provisional filing fee or cover sheet	
139	130	139	130	Non-English specification	
147	2,520	147	2,520	For filing a request for *ex parte* reexamination	
112	920*	112	920*	Requesting publication of SIR prior to Examiner action	
113	1,840*	113	1,840*	Requesting publication of SIR after Examiner action	
115	110	215	55	Extension for reply within first month	
116	400	216	200	Extension for reply within second month	
117	920	217	460	Extension for reply within third month	
118	1,440	218	720	Extension for reply within fourth month	
128	1,960	228	980	Extension for reply within fifth month	
119	320	219	160	Notice of Appeal	
120	320	220	160	Filing a brief in support of an appeal	160.00
121	280	221	140	Request for oral hearing	
138	1,510	138	1,510	Petition to institute a public use proceeding	
140	110	240	55	Petition to revive - unavoidable	
141	1,280	241	640	Petition to revive - unintentional	
142	1,280	242	640	Utility issue fee (or reissue)	
143	460	243	230	Design issue fee	
144	620	244	310	Plant issue fee	
122	130	122	130	Petitions to the Commissioner	
123	50	123	50	Processing fee under 37 CFR 1.17(q)	
126	180	126	180	Submission of Information Disclosure Stmt	
581	40	581	40	Recording each patent assignment per property (times number of properties)	
146	740	246	370	Filing a submission after final rejection (37 CFR § 1.129(a))	
149	740	249	370	For each additional invention to be examined (37 CFR § 1.129(b))	
179	740	279	370	Request for Continued Examination (RCE)	
169	900	169	900	Request for expedited examination of a design application	

Other fee (specify) ______________

*Reduced by Basic Filing Fee Paid SUBTOTAL (3) ($) 160.00

SUBMITTED BY

				Complete (*if applicable*)	
Name (*Print/Type*)	John J. Murphey	Registration No. (*Attorney/Agent*)	24,896	Telephone	760-431-0091
Signature	[signature]			Date	11/26/02

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.